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RESPONSE UNDER 37 C.F.R. § 1.116
EXPEDITED PROCEDURE
GROUP 2631

PATENT APPLICATION
Q-56457

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

RECEIVED

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Technology Center 2600

In re application of

Luc DARTOIS

Appln. No.: 09/429,026

Group Art Unit: 2631

Confirmation No.: 5442

Examiner: Qutbuddin GHULAMALI

Filed: October 29, 1999

For: METHOD FOR LINEARISING A POWER AMPLIFIER OVER A WIDE FREQUENCY
BAND

REQUEST FOR RECONSIDERATION UNDER 37 C.F.R. § 1.116
AND
REQUEST FOR INTERVIEW

MAIL STOP AF

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

This Request for Reconsideration is filed in response to the **final** Office Action (Paper
No. 12) mailed September 5, 2003.

Applicant notes the withdrawal of the previous final rejections under 35

U.S.C. § 102(e) and 103(a).

The Examiner has now issued **new** final rejections under 35 U.S.C. §§ 102(e) and 103(a)
based on **newly cited** Antonio '792.

More specifically, claims 1-10 and 12-15 stand finally rejected under 35 U.S.C. § 102(e)
as being anticipated by Antonio '792 (**newly cited**), and dependent claim 11 (11/1) stands finally

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rejected under 35 U.S.C. § 103(a) as being unpatentable over Antonio '792 (newly cited) in view of Ostberg '562 (previously cited).

Applicant respectfully traverses both of these rejections for the following reasons.

The rejection under 35 U.S.C. § 102(e) based on anticipation requires that Antonio '792 disclose, either expressly or inherently, each limitation of each of claims 1-10 and 12-15, or in other words, that each of claims 1-10 and 12-15 be readable, either expressly or inherently, on Antonio's disclosure.

Applicant respectfully submits that clearly such is **not** the case here, because Antonio does not disclose, either expressly or inherently, each of the limitations of independent parent claim 1.

Furthermore, Antonio does not disclose, or even suggest, either alone or in combination with Ostberg '562, all of the limitations/features of dependent claim 11 (11/1). In particular, Applicant respectfully traverses the Examiner's statement (in paragraph 6 on page 3 of the Office Action) that, "Antonio et al teaches every aspect of the claimed invention...".

The following analysis of Antonio's disclosure explains why the invention defined in independent parent claim 1 is neither anticipated, nor rendered obvious, by Antonio's disclosure, either alone or in combination with Ostberg:

(1) Most important, there is no teaching or suggestion in Antonio of the claimed method in which **the instantaneous frequency of each sample of input signal is measured, and wherein, to each real time sample, there is applied a (digital) predistortion "depending, for**

each example, on the estimated frequency of the input signal" (see claim 1, and also specification page 2, lines 5-9).

(2) At column 4, line 5, and column 6, line 18, *inter alia*, Antonio refers to single and multiple "IS95" carrier amplifiers with a limited useful instant frequency band as well as limited sampling frequency and, thus, explains, with the known flat response (in frequency) of today's UHF power transistors, why frequency-dependent distortion is **not** necessary (and, thus, is **not** explicitly addressed).

Also, in column 11 (TABLE 3), there is presented an example limited to maximum S*IS95 carriers where classic technology (1-dimension predistortion) is enough.

In column 4, beginning at line 42, Antonio clearly states that the look-up or predistortion table (LUT) is addressed by the input signal envelope (which mathematically does **not** contain any phase or **frequency** information from the input signal). This is reinforced by Fig. 2 showing a link from block 42 to block 44.

It is further reinforced by the details of box 44 and the succession of blocks 54, 58, 62 and 66 (Fig. 3), where voluntarily all non-envelope information is suppressed, and where even envelope information is compressed and is the sole input the lookup table (again, the predistortion application is nothing less and nothing more than applying lookup table coefficients to the input signal when the coefficients correspond to a lookup table (LUT) addressed corresponding to an input instant compressed envelope value.

Antonio, at column 7, lines 14-20, clearly excludes any other LUT input as well as any memory effect modeled in the table. Mathematically, a frequency dependent predistortion

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assumes a frequency dependent response of the HPA. As frequency physically is the "speed of the phase", it exists only by the difference in phase between a current and a past signal; therefore, there is no need for any kind of memory effect.

At column 8, lines 26-30, Antonio states that, **"only the envelope magnitude is important for predistortion purposes. The phase-independent transformation is accomplished by calculating the energy..."**. In column 9, Antonio describes "LUT(N)" with a 7 bit address; thus, there is no ambiguity that the LUT does not have a second dimension address.

Antonio describes a method for determining and adapting predistortion coefficients which is the so-called spectrum ratio or "RIO" method. This method is rather slow and is known to have the disadvantage to work for only a single dimension LUT because, due to integration time (FFT horizon) to measure the I/O spectrum contrast it is impossible to have a view and adapted any memory effect (this explains the assumption noted above at column 8, lines 14-20 of Antonio) or instant frequency dependent model. This is reserved to faster algorithm classes, comparing in real time each input and output sample (as in the present invention).

Last, but not least, Antonio refers, in column 4, lines 34-50 and TABLE 4 to a possible correction of the frequency response of the DAC by an adaptive inverse sinc filter. This is the only place in Antonio where frequency-dependent response of a component in the HPA is addressed. Thus, it is clear that Antonio's predistortion does **not take into account the frequency dependence** of the transfer function, because, if this were the case, the DAC side

effect would have been corrected by the overall predistortion adaptive loop as any other component in the chain from the predistortion output up to the last stage of the power amplifier.

Thus, even if Antonio were modified by Ostberg as proposed by the Examiner, there would not be produced the subject matter of claim 11 (11/1) or any subject matter which would have rendered claim 1 obvious to a person of ordinary skill in the art from the teachings of Antonio and Ostberg.

In **summary**, Figure 2 of Antonio, together with its description (in particular col. 4, lines 49-51) shows that the "Predistortion Look-Up Table 44" receives at its input the **envelope** of the input signal (output of "Envelope Calculation 42"). As a mathematical definition, the input signal **envelope** does **not** contain any phase or **frequency** information regarding the input signal. Furthermore, col. 7, lines 14-20, of Antonio clearly excludes that the Pre-distortion Look-Up Table 44 receives at its input any information other than the envelope of the input signal.

Indeed, in Antonio the non-linearities of the power amplifier are assumed to be "memoryless" and are a function of solely the instantaneous signal envelope. Therefore, they **cannot** be a function of the **frequency**, as the frequency physically is the "speed of the phase", i.e., it only exists by difference of phase from current and past signals, and, thus, needs a kind of memory effect. Therefore, at least for these reasons, Antonio does not disclose or suggest that the instantaneous frequency of each sampled input signal is estimated and predistortions are applied to the input signal, these predistortions" depending, for each sample, on the estimated instantaneous frequency of the input signal", as claimed by Applicant.

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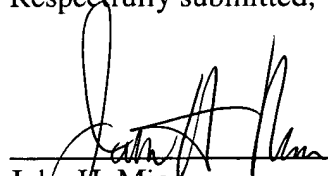
Therefore, Applicant respectfully requests the Examiner to reconsider and withdraw the rejections under 35 U.S.C. § 102(e) and 103(a), and to find the application to be in condition for allowance with all of claims 1-15; however, if for any reason the Examiner feels that the application is not now in condition for allowance, the Examiner is respectfully requested to **call the undersigned attorney** to discuss any unresolved issues and to expedite the disposition of the application.

Applicant files concurrently herewith a Petition (with fee) for an Extension of Time of One Month. Applicant hereby petitions for any extension of time which may be required to maintain the pendency of this application, and any required fee for such extension is to be charged to

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Deposit Account No. 19-4880. The Commissioner is also authorized to charge any additional fees under 37 C.F.R. § 1.16 and/or § 1.17 necessary to keep this application pending in the Patent and Trademark Office or credit any overpayment to said Deposit Account No. 19-4880.

Respectfully submitted,



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